

---

## Activating Hair Follicle Stem Cells via R-spondin2 to Stimulate Hair Growth.

**Journal:** J Invest Dermatol

**Publication Year:** 2016

**Authors:** Andrew A Smith, Jingtao Li, Bo Liu, Daniel Hunter, Malcolm Pyles, Martin Gillette, Girija R Dhamdhere, Arie Abo, Anthony Oro, Jill A Helms

**PubMed link:** 27109869

**Funding Grants:** CSUSB Bridges to Stem Cell Research

### Public Summary:

Wnt signaling is required for the development of the hair follicle, and for inciting the growth (anagen) phase of the hair cycle. Most strategies to enhance Wnt signaling for hair growth create a state of constitutive Wnt activation, which leads to neoplastic transformation of the epithelial hair matrix. Using Axin2LacZ/+ and Axin2Cre/+R26RmTmG/+ reporter mice and RNA analyses, we show that Wnt signaling is elevated during anagen, is reduced at the onset of catagen, and can be reamplified in the skin and surrounding hair follicles via intradermal injection of recombinant R-spondin2 protein. Using Lgr5LacZ/+ reporter mice, we demonstrate that this amplified Wnt environment leads to activation of leucine-rich repeat-containing G-protein coupled receptor 5-positive stem cells in the hair follicle. The onset of catagen is repressed by R-spondin2 injection, and the anagen phase persists. As a consequence, hair shafts grow longer. We conclude that R-spondin2 treatment activates hair follicle stem cells and therefore may have therapeutic potential to promote hair growth. Abbreviations:

### Scientific Abstract:

Wnt signaling is required for the development of the hair follicle, and for inciting the growth (anagen) phase of the hair cycle. Most strategies to enhance Wnt signaling for hair growth create a state of constitutive Wnt activation, which leads to neoplastic transformation of the epithelial hair matrix. Using Axin2(LacZ/+) and Axin2(Cre/+)R26R(mTmG/+) reporter mice and RNA analyses, we show that Wnt signaling is elevated during anagen, is reduced at the onset of catagen, and can be reamplified in the skin and surrounding hair follicles via intradermal injection of recombinant R-spondin2 protein. Using Lgr5(LacZ/+) reporter mice, we demonstrate that this amplified Wnt environment leads to activation of leucine-rich repeat-containing G-protein coupled receptor 5-positive stem cells in the hair follicle. The onset of catagen is repressed by R-spondin2 injection, and the anagen phase persists. As a consequence, hair shafts grow longer. We conclude that R-spondin2 treatment activates hair follicle stem cells and therefore may have therapeutic potential to promote hair growth.

---

**Source URL:** <https://www.cirm.ca.gov/about-cirm/publications/activating-hair-follicle-stem-cells-r-spondin2-stimulate-hair-growth>